

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference IPD/P1206/WOD	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 99/ 03538	International filing date (<i>day/month/year</i>) 26/10/1999	(Earliest) Priority Date (<i>day/month/year</i>) 28/10/1998
Applicant THE SECRETARY OF STATE FOR DEFENCE et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☒ furnished subsequently to this Authority in written form.

☒ furnished subsequently to this Authority in computer readable form.

☒ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☒ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☒ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

MUTANT LUCIFERASE HAVING INCREASED THERMOSTABILITY

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☒ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB 99/ 03538

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-5,7,8,21-30 (all partially)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-5,7,8,21-30 (all partially)

A protein having luciferase activity and at least 60% similarity to the luciferase from *Photinus pyralis* wherein in the sequence of the enzyme the amino acid residue at position 214 is different to the amino acid which appears in the corresponding wild-type sequence and wherein the luciferase enzyme has increased thermostability as compared to an enzyme having the amino acid of the wild-type luciferase at this position. Kit comprising the protein, nucleic acid encoding the protein, cell transformed with said vector and plant comprising such cells. Method for producing the protein comprising culturing such cell or growing such plant. Use of the protein in a bioluminescent assay.

2-36: Claims: 1-30 (all partially)

Subjects 2 to 36:

Each of the eight remaining substitution mutants (at positions 232, 295, 14, 35, 105, 234, 420 and 310) of *Photinus pyralis*; each of the nine substitution mutants (at positions 216, 234, 297, 16, 37, 106, 236, 422 and 312) of *Luciola mingrelica*; each of the nine substitution mutants (at positions 216, 234, 297, 17, 38, 107, 236, 422 and 312) of *Luciola cruciata*; each of the nine substitution mutants (at positions 216, 234, 297, 17, 38, 107, 236, 422 and 312) of *Luciola lateralis* which are recited in the claims.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/03538

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 C12N9/02 A01H4/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 C12N A01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98 46729 A (MURRAY JAMES AUGUSTUS HENRY ;SECR DEFENCE (GB); LOWE CHRISTOPHER R) 22 October 1998 (1998-10-22) the whole document	1-5,7,8, 21-30
A	EP 0 524 448 A (KIKKOMAN CORP) 27 January 1993 (1993-01-27) cited in the application the whole document	1-5,7,8, 21-30
A	WO 95 25798 A (SECR DEFENCE BRIT ;LOWE CHRISTOPHER ROBIN (GB); WHITE PETER JOHN () 28 September 1995 (1995-09-28) cited in the application the whole document	1-5,7,8, 21-30

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

13 March 2000

Date of mailing of the international search report

23.05.00

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Kaas, V

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/03538

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9846729 A	22-10-1998	AU 6929398 A EP 0973874 A	11-11-1998 26-01-2000
EP 0524448 A	27-01-1993	DE 69229376 D US 5229285 A JP 5244942 A	15-07-1999 20-07-1993 24-09-1993
WO 9525798 A	28-09-1995	AU 697883 B AU 1954595 A BR 9507140 A CA 2186144 A CN 1149318 A EP 0751996 A FI 963741 A GB 2301592 A,B JP 9510610 T NO 963983 A	22-10-1998 09-10-1995 30-09-1997 28-09-1995 07-05-1997 08-01-1997 20-11-1996 11-12-1996 28-10-1997 23-09-1996